AGRICULTURAL NEWS LETTER

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This publication contains information regarding new developments of interest to agriculture based on laboratory and field investigations by the Du Pont Company. It also contains published reports of investigators at agricultural experiment stations and other institutions as related to the Company's products and other subjects of agricultural interest.

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AGRICULTURAL NEWS LETTER

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THE AGRICULTURAL NEWS LETTER serves as a medium of reporting new developments and ideas in agriculture, particularly those related to advancements through research. Material herein may be reprinted, in whole or in part, in the interest of advancing the general knowledge of new agricultural practices.

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OTTO J. DEKOM.....*Editor*

KEEPING UP WITH CONSUMERS

A century ago, animals were "trailed" to the cities of America, sometimes hundreds of miles, for slaughter. The animal had to be brought directly to the consumer, because modern means of refrigeration were not yet available. After 1870, when mechanical refrigeration became generally adopted, and rail transportation was expanded, the meat itself could be moved from slaughter to the consumer over long distances. Large livestock markets and packing centers developed — the largest of them Chicago. In 1918, the Windy City accounted for more than 17 per cent of all commercial cattle slaughter and almost 16 per cent of hogs.

But, technology and population have moved far since then. For one, truck transportation made shipping, both short and long distance, more flexible. Changes in packing and slaughtering methods, plus many improvements in the mechanization of handling and processing, made decentralization of operations feasible.

The population explosion and the shift in population concentration not only changed distribution patterns, but the larger markets made feasible establishment of new plants in other areas of the country. The abandoned, half-century-old structures in the Union Stock Yards are witnesses to the fact that Chicago is no longer "hog butcher to the world."

More than that, they are witnesses to the pace of change that affects every producer of goods and services in the United States: every farmer, manufacturer, and businessman. They point up that pursuit of the customer, his wishes, his whims, his changes, is the ruling factor in a free economy. And, the same law affects the "big four" of the meat packing industry or the "little million" of farming. The product mix of Du Pont, a company with an operating investment approaching $3 billion, is in constant turmoil to meet customer wishes, and its plants are often rebuilt, shifted, or even taken out of production to meet changing conditions.

IN THIS ISSUE

to "expand circle of friendship"

DU PONT WORKS WITH FARM YOUTH GROUPS

To "expand the circle of friendship" between industry and agriculture throughout United States farming areas, Du Pont has maintained and expanded its participation in 4-H programs and the activities of the Future Farmers of America.

The keynote to these youth programs was struck by Clark W. Davis, general manager of the Du Pont Industrial and Biochemicals Department, who said that "as we get better acquainted with these young people, our circle of friendship spreads a little further through rural America."

Mr. Davis, who is largely responsible for the company's participation in the youth projects, has been an active leader in the youth programs, both within the Company and at national events of the two organizations. He has expressed the hope that "through their acquaintance with Du Pont, as well as other firms, and with us as individuals, these boys and girls and their families will always feel that they have good friends and good neighbors in the business community."

Among important recent events indicative of the scope and nature of Du Pont's participation are two occasions honoring two groups of outstanding young people. At the 1960 National Convention of the Future Farmers of America in Kansas City, Arden Uhlir, Star Farmer of America, and the three regional Star Farmers, with their families and advisors, were guests of Du Pont at a special luncheon.

At the 1960 National 4-H Club Congress in Chicago, the six national winners in the 4-H beef awards program, sponsored by the Du Pont Company, received college scholarships, and all of the state winners were guests at a dinner in their honor. Du Pont began sponsorship of the beef awards in 1959. Awards are made on the basis of over-all achievements, rather than solely on the raising of blue-ribbon animals.

A third group, the national officers of the Future Farmers of America, visited the Du Pont Company offices and laboratories in Wilmington, Del., in February at the start of their 1961 goodwill tour of industry.

THE 1960 national 4-H beef scholarship winners, pictured with Du Pont Company officials at the National 4-H Club Congress, in Chicago are, left to right, Clark W. Davis, general manager, Du Pont Industrial and Biochemicals Department; Bonnie Sue Gleason, Eagle Rock, Va.; Henry B. du Pont, a Du Pont vice president and board member; Max Lee Lenderman, West Terre Haute, Ind.; Jo G. Prichard, III, Inverness, Miss.; Bruce Robinett, Douglas, Okla.; Charles Howard Streett, III, Long Green, Md.; and Larry Austin, Julesburg, Colo.

PICTURED at a Du Pont luncheon honoring the 1960 Star Farmers, during the National Convention of the Future Farmers of America in Kansas City, are, left to right, Honorable Edward Foss Wilson, Assistant Secretary of Health, Education and Welfare; Clark W. Davis, general manager of the Du Pont Industrial and Biochemicals Department; Arden W. Uhlir, of Verdigre, Neb., Star Farmer of America; Jerrald Duayne Truax, Steamboat Springs, Colo., Star American Farmer of the Pacific Region; Sam B. McDonald, Carthage, Tenn., Star American Farmer of the Southern Region; Charles A. Sargent, Marshfield, Vt., Star American Farmer of the North Atlantic Region; and Dr. William T. Spanton, national advisor of the Future Farmers of America. Mr. Wilson and Mr. Davis have been for several years members of the board of judges who have selected the Star Farmer of America.

FEED UREA COMES INTO ITS OWN

By R. J. Bacon
Industrial & Biochemicals Department
E. I. du Pont de Nemours & Co. (Inc.)

Since the introduction of the urea-based "Two-Sixty-Two" feed compound toward the end of World War II, a body of literature, totaling over 1,000 publications, has presented scientific evidence of the performance of urea as an ingredient for ruminant feed.

Originally made from coal, air, and water, urea is now manufactured from a combination of gases (oxygen, carbon dioxide, hydrogen, and nitrogen) which are processed to produce a clear water solution of urea, that crystallizes out to 99.6 per cent purity.

In feed, urea provides a simple source of nitrogen utilized directly by micro-organisms in the rumen, without going through the process of breaking down the more complex protein sources of nitrogen. This quickly-available nitrogen permits better breakdown of starches and higher utilization of cellulose.

Animal Produces Urea

Small amounts of urea occur in wheat, oats, alfalfa, and all the protein meals. In fact, the ruminant animal makes use of the urea produced in its own body and particularly so when the feed is very low in nitrogen sources.

Normally, natural urea occurs in cow's saliva, and is cycled back and forth against the time when it may be needed to supplement some low-grade food.

Properly mixed with carbohydrates in feed, a given amount of "Two-Sixty-Two" feed compound will provide the equivalent of 262 per cent protein in the feed.

As with any other first-class source of protein, performance of the feed depends on the quality and balance of all ingredients used. As a source of protein, urea ranks with the best feed ingredients used in ruminant rations.

No Harmful Effects

In spite of a decade and a half of successful use in ruminant feeds, there are still questions about the effect of urea on livestock. Leading veterinarians agree that, in properly mixed feeds, a suitable proportion of urea can have no harmful effects on ruminants.

In fact, health and performance of animals on rations containing urea have generally been at least as good as would be expected from comparable rations without urea. It has been used successfully with Holstein calves. In a Michigan trial, whole milk feeding was discontinued at 11 days of age, and the calves went on a milk-replacer in which urea was used as a nitrogen source, replacing a high percentage of nitrogen from dried skim milk in the control diet.

Another Michigan study compared one pound per day of a simple, low-cost 65 per cent protein supplement containing a large amount of urea with two pounds per day of a more complex 32 per cent protein ration. The only difference in the two rations was the source of protein and a small amount of energy. Rations were fed to fattening steer calves in open feed bunks, along with shelled corn to make up to one per cent body weight of concentrate feed and corn silage free choice.

At the end of 119 days on feed, there was no difference in average daily gain, feed consumption or feed efficiency.

No digestive disturbances or palatability problems were observed in either lot. Even on wet, rainy days, both groups of steers consumed their feed readily from the open feed bunks. Although carcass data were not reported, at the close of the trial all steers in both lots were approaching "choice" slaughter grade.

Specific questions on the use and effects of urea in feed may be addressed to the Editor, *Agricultural News Letter,* Du Pont Company, Wilmington 98, Del., to be answered by experts in animal health and nutrition.

DU PONT MOVIES AVAILABLE

Three new color 16mm sound movies of farm and recreational interest are available without charge from the Du Pont Company for group showing. Of particular significance to farmers in the south-east and mid-south cotton areas is *Clean Cotton,* which details weed control practices from planting to harvest. Emphasis is on application at lay-by time, calibration, and results through use of "Karmex" diuron weed killers. The film takes 18 minutes of playing time.

The diversity of the American landscape—with its unmatched scenery, historic shrines, and vast recreational areas accessible to the motorist—is the subject of a 28-minute film. *Highway Holiday* takes a leisurely tour of such scenic high spots as the cherry blossoms in Washington, Shakespearean theater at Stratford, Conn., giant combines operating in Kansas, and the Athabaska Glacier of Alaska.

For the fisherman, a 15-minute movie entitled *Hook, Line, and What Knot?* explains how to tie three useful knots using monofilament spinning line in order to retain line strength in actual use. For further information on these three pictures address: Editor, *Agricultural News Letter,* Du Pont Company, Wilmington 98, Del.

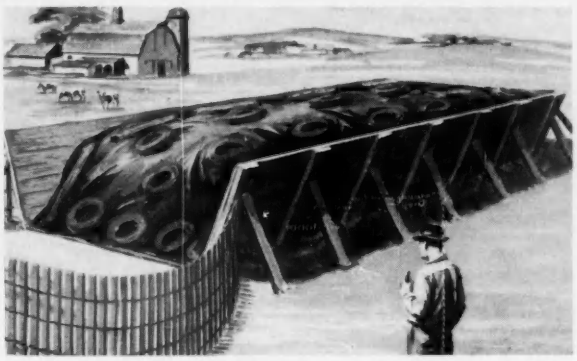
modern farming techniques with

AGRICULTURAL FILMS

The American farmer, always seeking new ideas to help him modernize his business, will find several handy ideas in a new booklet, *Farm Uses and Specifications for Du Pont Polyethylene Film.*

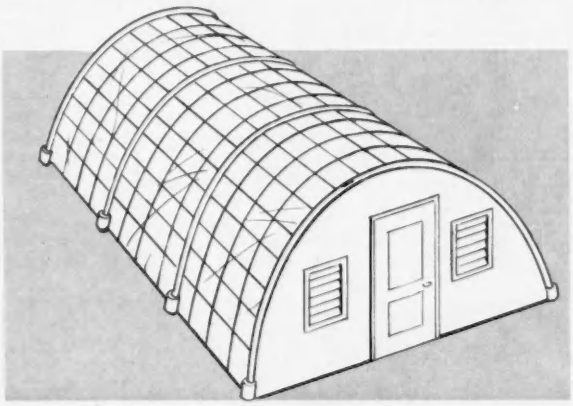
The illustrated "how-to-do-it" brochure contains 18 pages of information on how the farmer can use this tough plastic film to cut costs, save work, advance maturing of crops for earlier marketing premiums, and better protect field-stored crops or machinery.

The new booklet is available, without charge, from local farm supply dealers handling the new Du Pont agricultural films, or from: Editor, *Agricultural News Letter,* Du Pont Company, Wilmington 98, Del.

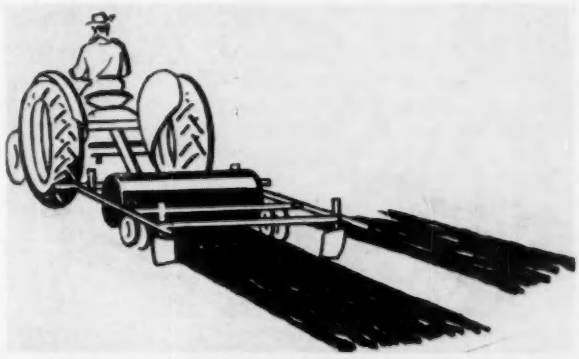


DU PONT BLACK POLYETHYLENE film, covering easily built horizontal bunker, trench, or stack silo, reduces problems of silage spoilage. Film caps on tower silos provide effective protection against spoilage.

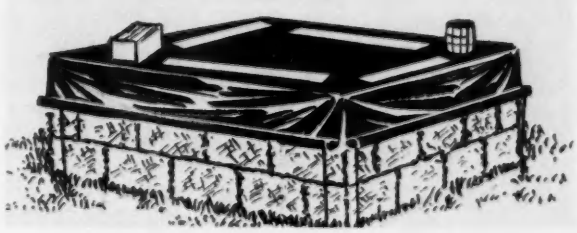
SEEPAGE LOSS of valuable irrigation water is effectively reduced with ditch liner of Du Pont black (weatherable) polyethylene film. Use of liner also helps prevent erosion, eliminates weeds in ditches.



INEXPENSIVE, temporary, or portable greenhouses glazed with clear polyethylene film (above) allow early start for transplantable crops, or out-of-season flowers which can add to farm revenue. Wicket supported row covers of clear film (below) permit farmers to plant despite 25° night temperature, and harvest vegetable and strawberry crops several weeks earlier for bonus prices.



MULCHING ROW crops with black polyethylene (above) virtually eliminates need to cultivate, also warms soil for early strong root growth and conserves moisture. Economical, weather-proof tarpaulins of black polyethylene (below) may be used as cover for hay, straw, and corn, making outdoor storage less risky in all kinds of weather. Covering machinery stored in open frees buildings for crop storage.



protecting orchards and woodlands with

CHEMICAL REPELLENT FOR BROWSING ANIMALS

By T. C. Ryker, Ph.D.
Industrial & Biochemicals Department
E. I. du Pont de Nemours & Co. (Inc.)

A year's profit from orchards or woodlands may literally hang on the tender new shoots which are so attractive to hungry rabbits, browsing deer, and other wildlife in the wintertime. Even more may depend on the survival of new orchard and forest seedlings. Previous preliminary studies reported here* have been confirmed by mounting evidence that rabbit damage and deer browsing can be effectively prevented through the use of "Arasan" 42-S thiram fungicide and repellent. This chemical, already widely used as a seed protectant, is known to prevent seed damage from rodents, birds, and other wild predators, especially in direct forest seedlings.

*"*A Wide Spectrum Repellent*," Agricultural News Letter *28:3, page 9, Fall 1960; "Protection of Nursery Stock from Rodents,"* Ibid. *27:3, page 18, Fall 1959; "Chemicals to Protect Orchards from Wildlife,"* Ibid. *28:1, Winter 1959-60.*

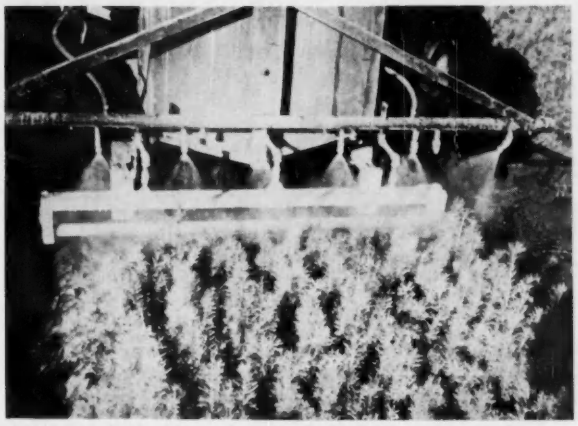
Methods of Application

To protect twigs and trunks, the material can be applied with a brush, hand pressure sprayer, or hose sprayer, and one application lasts three to six months. Various paper companies and other woodland operators have also protected new forest plantings successfully with a seedling dip treatment at the time of transplanting. Spray application in beds before transplanting has also been

SUMMARY OF EXPERIENCE

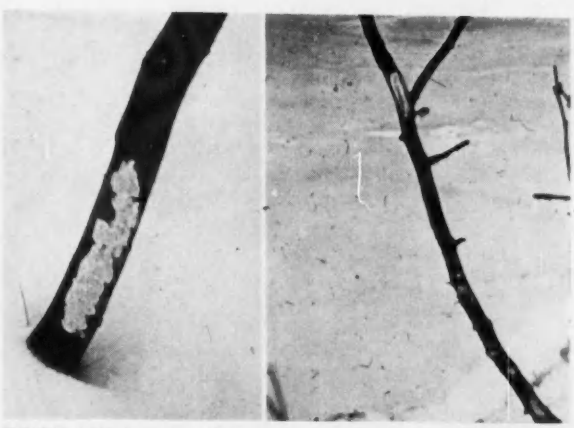
State	Crop	To Protect Against	42-S	Sticker*	Water	Appl. Method	Remarks
Mass.	Apples	Deer	2 gal. 8 " 20 " 2 "	1 gal. 1 " 1 " 1 "	97 gal. 91 " 79 " 97 "	Spray " " "	Higher rates or repeat applications may be necessary under heavy deer pressure.
Calif.	Apples	Deer	1 qt.	1 pt.[1]	1 gal.	Spray	Repeat treatment at 6 to 8 week intervals needed to protect growth.
Calif.	Lemons Oranges Avocados	Rabbits	½ gal. 1 part		100 gal. 4 parts	Spray	Applied to foliage; no phytotoxic effect.
Calif.	Grapes and Plums	Rabbits	1 part	[2]	4 parts	Spray	No sticker needed in arid regions.
N. J.	Apples	Rabbits	1 qt.	1 qt.	2 qts.	Spray	Gave complete protection; trees about one inch in diameter. Estimated 70 trees treated with one gallon of spray.
Texas	Pecans	Porcupines	2 gal.		98 gal.	Spray	
Wash.	Forest Seedlings	Rabbits	10 gal.	[2]	90 gal.	Spray	Applied just before lifting to protect after transplanting; 100 gallons treated ½ acre or 500,000 plants.
Tenn.	Forest Seedlings	Rabbits	1 part	½ part	4 parts	Dip	Used for winter plantings; costs 50 to 70 cents per acre.
N. Y.	Roses	Rabbits	1 part	1 part	30 parts	Spray	
Del.	English Holly	Rabbits	1 gal.	[2]	3 gal.	Spray	

* *Rhoplex A-33 unless otherwise indicated.*
1 Plyac.
2 Sticker used, amount and product not known.



SPRAY APPLICATION of "Arasan" 42-S in forest plant beds before transplanting has been effective for protecting seedlings from damage by browsing rabbits during the seedlings' first season in forestland.

YOUNG ORCHARD has been invaded by hungry rabbits, who have left their trademark on every tree in sight, suppressing growth and even killing trees. Height of damage will depend on depth of snow.



TYPICAL DEER browsing in tender new apple shoots (right) damages or destroys productive wood. Rabbits feed on soft bark of young plantings (left) to the point they can reach from ground or snow.

effective for protecting seedlings during the first season in the forestland.

Du Pont tests with undiluted "Arasan" 42-S brushed onto apple tree stems indicate that protection will last about three months. With the addition of one per cent sticker, protection lasted as long as seven months.

Besides holding the chemical onto treated surfaces, the sticker can be expected to reduce transpiration and prove an aid in protecting plants against winter injury. Since the repellent apparently has to be tasted to be effective, a long-lasting substantial coating is desirable. There have been no phytotoxic effects even with treatment of succulent apple shoots and citrus foliage.

Used as Dip Treatment

Other orchards and woodland trials have been conducted in 11 states and Canada with uniform success. In some cases, foliage, as well as twigs and trunks, has been treated. The variety of successful applications is shown in the accompanying tabulation on page 6.

"Arasan" 42-S has also been successfully used as a dip treatment to protect transplants from deer and rabbits in West Virginia and Texas. It has been sprayed on transplanted pine seedlings in California and Louisiana, and on Christmas trees in Oregon. Where comparisons have been reported, severe damage was evident on the untreated plantings, but the chemical treatment gave full protection.

There is a Canadian report that "Arasan" 42-S painted on stems of hardwood plantings in an arboretum gave satisfactory protection on roses, sugar maple, white ash, black cherry, and white oak. Similar results were obtained when it was painted on stems of olive and pine trees in California plantings.

Other Chemicals under Study

Many other repellent uses are being studied, but their application depends upon overcoming the problem of chemical residues in plant parts intended for food or feed. These include protection of cherries from birds, seedlings of vegetables and grains from rabbits, and sorghum grain heads from birds.

In one midwestern test, blackbirds damaged 80 per cent of the corn ears in a field that was not treated, but left a treated field after damaging only a few ears. In another corn field, in the Northeast, "Arasan" 42-S sprayed on corn stalks prevented severe racoon damage which had ruined untreated stalks in an adjacent area. In Idaho one trial showed that spraying around the base of a stack of baled hay would keep jack rabbits from feeding on the hay.

NEW HERBICIDE RECOMMENDATIONS

By L. A. Conn
Industrial & Biochemicals Department
E. I. du Pont de Nemours & Co. (Inc.)

Recommendations for control of phragmites and kudzu, weed species which are serious problems to industry and agriculture in certain regions, have been added to the label for Du Pont "Trysben" 200 weed killer, along with black locust, blueweed, and climbing milkweed. The blueweed control recommendation has also been added to the label for Du Pont "Zobar" weed killer.

Kudzu is a serious weed pest in southern areas capable of smothering trees 80 feet tall, and frequently interfering with power and telephone lines and railway systems, as well as being a menace to highway safety and a problem in agricultural land. It is a woody vine which can spread as much as 30 feet in a year through rhizomes and stolons from one source, and builds up in layers, often waist high. Its dense and vigorous growth has been difficult to control with foliage sprays, and various mechanical control measures have been ineffective. "Trysben", which works through both foliage and roots, has frequently given complete kill with one application. Recommendations for control with "Trysben" are based on field trials in Alabama, North Carolina, South Carolina, and Mississippi.

The recommendation, as for other woody vines, is five to 10 gallons of "Trysben" per acre, applied as a foliage spray in enough water for thorough coverage of foliage and soil.

Control of Reed

Phragmites is the common reed *(Phragmites communis)* which grows extensively and aggressively in marshy areas throughout the Northeast. It is particularly conspicuous in the northern New Jersey areas approaching New York City. Although this plant is frequently of value as a wildlife food, and also has some soil conservation value, it grows so aggressively that it interferes with drainage. In dry seasons, or as it approaches maturity, it becomes a serious fire hazard, particularly in industrialized areas. Even for wildlife food, it defeats its own purpose by closing in so densely that there are no cleared areas or water for birds to land on.

Recommendation for the use of "Trysben" is to apply 10 gallons (20 pounds acid equivalent per acre) during the early spring period, either before plants have emerged, or soon after emergence. This recommendation is based on trials in Delaware and New Jersey, where this rate of application showed 95 per cent control or better within six months after treatment.

Black Locust Recommendation

The new recommendation for control of black locust is based on trials in Ohio, Alabama, and Virginia. It follows the method of using "Trysben" for control of certain other woody brush species—two gallons of the material in 100 gallons of water applied liberally on foliage, stems, and the ground surface at the base of the plants.

Blueweed and climbing milkweed, which are classed as noxious perennial weeds in some areas, can be controlled with five to 10 gallons of "Trysben" 200 per acre, or one to two pints per 1,000 square feet.

"Trysben" 200 is a liquid to be diluted with water, and applied as a coarse spray. Where ground cover is light, spray should be mixed to provide at least 50 gallons of spray per acre. Where ground cover is heavy, a volume of up to 400 gallons per acre may be needed to assure uniform and thorough coverage of both foliage and soil.

Precautions on the label should be carefully followed, as for all chemicals.

GROWTH OF kudzu, a serious pest in southern areas, is a problem for both industry and agriculture. Weed can smother 80-foot trees.

CONTROL OF kudzu along railroad is achieved with spray of Du Pont "Trysben" 200 weed killer, which works through foliage and roots.

COMPETITION UNLIMITED

By DAVID H. DAWSON*
Vice President
E. I. du Pont de Nemours & Company (Inc.)

Whether our future growth will be the satisfying one of the Fifties, the accelerated one of the soothsayers of a year ago, or the declining one of the newly fashionable pessimists, we can be sure that we will find growth, as always, accompanied by change. Our success, as industries or individual businesses, will depend on our knowledge of changing markets and ability to change with them.

We will see competition within industries and among great industrial nations. It will be complicated by vastly stepped-up competition, both political and economic, between the Free World and the Communist World.

Let us examine four areas where competition in the Sixties may be expected to be most acute.

Competition for Manpower

First is manpower: the next ten years will see talent hunts far surpassing anything we have experienced to date. As the technological aspects of our business become ever more complex, we will inevitably be competing for more and more of the technically trained young men who will stimulate growth and provide the ideas.

Du Pont, early dedicated to research, once had no difficulty enlisting all the chemists it needed. Today, it must battle for its share, not only with its research-minded immediate competitors, but with oil companies, rubber companies, pharmaceutical houses. Conversely, Du Pont competes with other industries for metallurgists, physicists, geologists, and other trained people.

A second area where competition will almost certainly grow is between related products which perform roughly the same function, though they may be of different origins. Sometimes described as supplantive competition, this frequently involves the displacement of an older product. In plastics remarkable strides have been made in markets traditionally reserved to older materials. Cellophane and polyethylene have taken over applications once the province of paper. Polyvinyl chlorides replace leather. Formaldehyde resins replace metal in pipe, for example, and polyethylene is a good alternative for tin plate and glass. Plastic pipe is replacing metal for many uses.

The third is competition from abroad. Its effect on our economy is one of the great uncertainties of the 1960's. In the Fifties — at least until the last several years — foreign competition in most of our manufacturing industries has been of limited importance. In 1959 our imports exceeded exports. Western Europe and Japan have been rebuilding their production facilities. They have had access to much of American technology, and have had the advantage of American economic aid.

Lower Labor Rates

And, to date, they have retained their own advantage of low labor rates — from one-half to one-tenth of those in this country. The American manufacturing worker is paid an average of $2.30 an hour, with an additional 40 cents in benefits. For some craftsmen, the rate is $3 or more. The Italian skilled worker draws 90 cents, the West German 80 (for a 45-hour week), the Japanese 56 cents, the French about 90.

To meet foreign competition successfully will require continued improvement in the productivity of our industries, expansion of our productive capacity and of our financial reserves. It means economic incentives to encourage individuals to work at the top of their talents and financial incentives to stimulate the creation of new capital. We must continue to stimulate technological growth through encouragement of research.

Competition of Ideas

The fourth area is more significant in determining our future: the competition of ideas. The ideas of freedom, which have been the driving force behind our economic development, will continue to do battle in the court of world opinion with the ideas of state control, socialism, communism, and dictatorship.

We find arrayed against us zealous, dedicated antagonists abroad, the prophets of the new feudalism. At home there continues to be a large body of opinion earnestly striving to dilute the strength of our free economy by seeking even more regulation, control, and fractionization of business. The times require an equal dedication from those who speak for freedom. Above all, a strong America needs healthy, dynamic, competitive industry; we should be alert to the attempts to weaken it; we should be prepared to defend it in the struggle for men's minds.

* *Excerpts from a speech before the Texas Mid-Continent Oil & Gas Association, San Antonio.*

EVERY DAY IS

Exaggerated as the slogan "Every Day Is Bargain Day" may sound when used by obscure shops in the "low-rent district," it is a good description of the cost of things bought by U.S. consumers. The most remarkable product of this country's dynamic free economy has been an unprecedented flow of bargains from farms and factories.

These bargains result from the fact that technology has multiplied man's strength, skill, and capacity for work. Machines, chemicals, and tools have taken the place of human effort in the productive process. In both industry and agriculture, it has been the development of the machine, the application of science to the problems of production, and the investment of tremendous amounts of capital that have created today's abundance.

In the past century, these factors have multiplied by 10 the efficiency of each production worker. In the past 40 years alone, they have almost quadrupled the hourly output of a typical farm or manufacturing workman, lifting his wages and purchasing power, and pushing up the standard of living for all Americans.

Manufacturing employment in 1960 is about 10 per cent over the 1947-1949 average, but the total index of manufacturing production is up nearly 50 per cent. In farm production, a man-hour of labor now produces nearly three times the output of 20 years ago. It took 13.5 million farm workers in World War I, and 10.5 million in World War II. Today, farm output is one-third higher than in World War II, but the number of farm workers is down to seven million.

"Economic Cost" Is Low

Even though today's prices may seem far above the 20-cent steak or the $800 automobile, the economic cost of virtually all products is at an all-time low. "Economic cost" means the cost in terms of economic activity or labor needed to earn the purchase price. For, a 20-cent steak is an expensive commodity when earnings per hour are 30 cents or less, while the $800 automobile is out of reach.

On the other hand, when the average industrial wage is $2.30 per hour, the dollar steak is not beyond reach and American farmers and workers find a $2,500 automobile to be a good buy.

It is evident, therefore, that a price tag is only a symbol, and one that can be misleading. To have meaning, prices must be evaluated in terms of purchasing power or "economic cost." It is only through such an evaluation that the economic bargains available to the United States population are recognized.

Purchasing power is not money; it is the measure of what money will buy. Over the years, the general trend of prices has been upward. Since the pre-depression year, 1929, the consumer price index has climbed 70 per cent. If value were determined strictly by the price level, most products on the market today would be a poor buy. Exactly the reverse is true. Products were never a better buy. Wages have climbed far more than prices (average weekly earnings are nearly four times the 1929 level) and consumers can buy products at a smaller financial sacrifice.

Cost of Food

The industrial worker today earns enough in one hour to pay for a meal for four persons. A little book published in 1901 *(The Cost of Food* by Ellen H. Richards) points out that, although "twenty-five cents per day per person may be considered" the food budget of the working family, this amount of money represented half his earnings.

In other words, the 1901 worker put in 105 hours of work per month to earn food for his family, even though ham sold for 15 cents a pound and milk two cents a quart. Today, with the price tag much bigger, he can earn the food market basket in only 40 hours of work. And, conversely, so the farmer can fill his "market basket" of industrial goods at less economic cost.

RISE IN cost of living is largely due to higher price of services, rather than of commodities, as shown in the component parts of the consumer price index compiled by the U.S. Department of Labor.

BARGAIN DAY

Similar bargains are to be had in manufactured goods. For example, the working time necessary to buy a 1929 refrigerator would buy three modern, improved units at today's wages. Other examples of today's bargains in various products are illustrated on the right.

Difference Is in Services

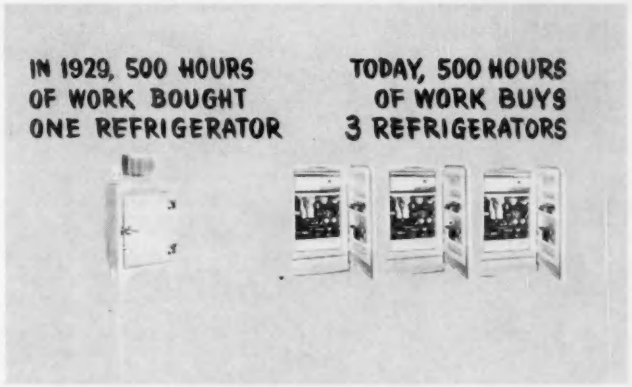
The ability of the goods producing sectors of the economy to raise productivity is clearly reflected in the cost of living. The Labor Department's consumer price index shows that the price of all commodities has increased 18 per cent above the 1947-1949 average, whereas the total index is up 27 per cent.

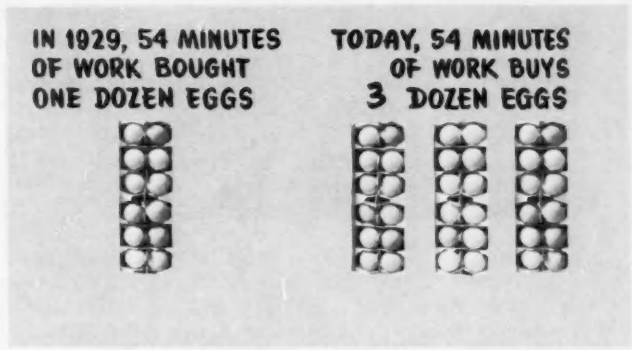
The difference in the index is in the 51 per cent higher price of the services. In the area of the services, prices are less subject to the impact of technology. Mass production is often impossible or undesirable, and wages or salaries sometimes climb without any rise in efficiency. As a result, the price of services climbs faster than the price of products. It is a simple matter of supply and demand. If people want to have certain services performed—as they have clearly indicated they do —then they must pay enough to attract the individuals who can perform them. For instance, the cost of housing is up 31 per cent, medical care 56 per cent, personal care 33 per cent, and transportation 46 per cent.

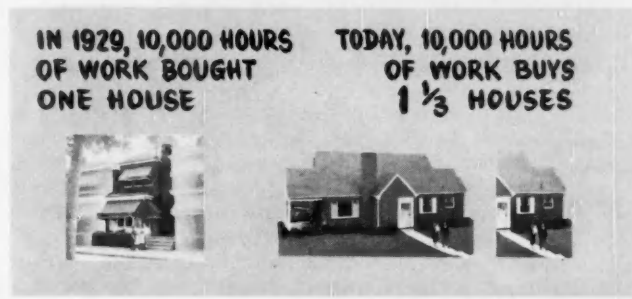
Of Mutual Benefit

The industrial-farm productivity level is, obviously, of mutual benefit to both producers. Agriculture is a major consumer of manufactured products and their favorable "economic cost" is equally significant. Agriculture uses about 6.5 million tons of finished steel per year, 40 million tons of chemical materials, and enough raw rubber to make tires for six million automobiles — plus a vast variety of goods for farm, home, recreation, and transportation.

On the other side of the ledger, the country purchases some $40 billion in farm products. And, on this purchase, the effect of high productivity is as beneficial to the entire economy—both in terms of living standards and growth opportunities — as is the productivity advances made by manufacturing industry.



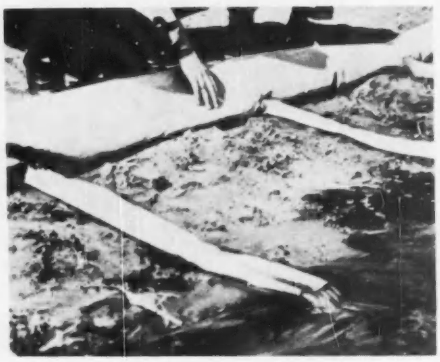




DIFFERENCE between "price" and "value" is illustrated by a comparison of the working time an average industrial employee needs to earn the price of typical products. In each case, technology has multiplied his earning power, even though the price tag on most commodities has risen. In addition, many products, such as refrigerators, represent better value, greater convenience, and more efficiency.

new PRODUCTS AND APPLICATIONS

A new type of polyethylene film for bagging of produce and other products has been introduced by Du Pont. It is designated "2-in-1" film because it combines high transparency with strength at low cost. Production samples of 1.5-mil film withstood 25 per cent more drops than currently existing high impact films of the same thickness, and 150 per cent more drops than high clarity films. This newest member of Du Pont's family of films has uniform thickness and has a high yield of 30,000 square inches per pound in 100-gauge (one-mil) thickness. It is also available in 125, 150, and 200-gauge thicknesses. Fifty produce packers are already using the bags of the new film for packaging items ranging from radishes to grapefruit.



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A portable irrigation tube of nylon fabric coated with neoprene will simplify water distribution on the farm and cut costs. The new units consist of a 12-inch diameter tube, 100 feet long, to which four-inch outlet tubes, five feet long, are attached. The tubes are attached to water hydrants spaced 200 feet apart. Ten sections, each 10 feet by one-quarter mile, are flooded at one time by the outlet tubes. The new tubing is easier to handle and less costly than aluminum and has a considerably longer wear-life than canvas. It has been tested to withstand hydrostatic pressure of 64 pounds, better than twice the pressure encountered in actual service.

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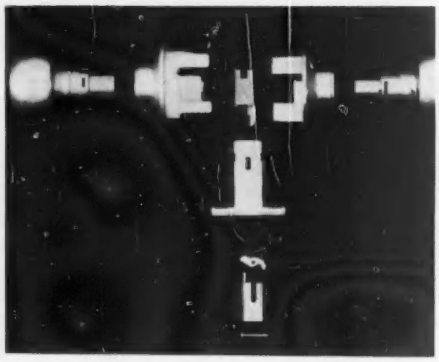
Du Pont's 66 and 610 "Zytel" nylon resins have been established as safe in food handling and processing by the Food and Drug Administration. The ruling is expected to have considerable impact in the dairy equipment field. Already field tested as components for milking machines and in vacuum and conveying lines in dairies, "Zytel" has the advantage of being heat sterilizable. Its low coefficient of friction and the ease with which it can be molded into complex shapes make it ideal for replacement of valves and fittings. Such fittings are now made of expensive metal alloys to withstand the frequent dismantling, brushing, corrosive cleaning solutions, and steam sterilization required in milk processing.



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A major innovation in builders' hardware — a lockset with a nylon mechanism — is now available to the farm handyman. Made both for passage doors, and for bath and bedroom doors which require push-button privacy, the locksets provide longer life, easier installation, and absence of service problems. "Zytel" nylon resin is resilient and has low friction, providing quiet operation without lubrication. In tests, locksets operated smoothly after 1.2 million cycles, equivalent to 80 years of use. The mechanism cannot rust, is unaffected by moisture, and the plastic prevents electrolytic corrosion. The design makes accidental misassembly impossible.

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Contour bags of heat-shrinkable "Mylar" polyester film for wrapping poultry were demonstrated by Du Pont at the 1961 Fact Finding Conference of the Institute of American Poultry Industries recently. "The extreme clarity, flavor protection, and durability of 'Mylar' give poultry a greater sales advantage," said Robert C. Myers, director of packaging sales for Du Pont. "Products also keep better because 'Mylar' is highly impermeable to moisture and vapor. In addition, the film's strength cuts breakage to a minimum, eliminating virtually all rewrapping by dealers and preventing freezer burn due to exposure of the product at package break-points." Bags are available nationally through distributors at a price comparable to bags made from other shrinkable films.

A special neoprene-cement compound, now being used as a laboratory flooring, offers more effective resistance to bacterial and virus contamination than flooring materials usually employed. One problem solved is the intrusion of germs and bacteria into small cracks and crevices in the flooring of animal research laboratories, and the difficulty of keeping floor surfaces clean and germ free when constantly contaminated by animal urine and fecal matter. The neoprene flooring is a quarter-inch thick, applied by trowel, and is completely free of joints, seams, or cracks, thus eliminating a prominent growth spot for bacteria and germs. It is turned up at the walls into an integral cove base, further reducing the problem of joints at the floor level. This also facilitates cleaning.

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Knee-high protective boots of molded neoprene feature a special kick-off spur, allowing removal of muddy or wet boots without soiling hands. Neoprene resists abrasion, weather, farm chemicals, barnyard acids, and oil. The one button at the top makes the boots easier to put on and take off, particularly when hands are cold and numb. Being lighter, they are easier to wear than old-style arctic boots. Tops are tight enough to keep out snow, but loose enough to permit air to be drawn in, whether worn inside or outside the trousers. The patented design produces bellows-like action with each step, and ridges molded inside assure air circulation.

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A new Du Pont sponge cloth, reinforced by a net of strong fibers through the center, is a tough, versatile aid for many types of home and farm cleaning jobs. Called all-purpose household sponge cloth, it is ideal for wiping work tables and dairy equipment, and for dishwashing, window cleaning, and a host of other clean-up chores for which rags were used formerly. The 7.5 by 10-inch sponge cloth is bulky enough to provide good absorbency, but also pliable and easy to handle. Its strength is combined with the same durability engineered into regular cellulose sponges to resist damage by cleaning compounds, soaps, grease, and grit.

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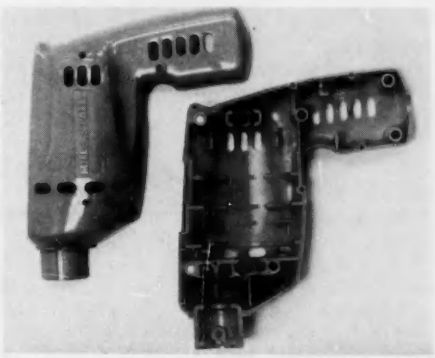

A new quarter-inch power drill "double insulated" by means of a molded nylon housing is especially useful for jobs on the farm. Du Pont "Zytel" nylon resin makes possible a major design innovation which out-performs the traditional metal housing. Nylon is nonconductive, self-extinguishing when exposed to an open flame, as well as rugged and impact-resistant. The plastic can be colored integrally and is mass-produced by injection molding. The close-tolerance molding simplifies assembly and eliminates the costly machining needed for metals. Advantages include less heat build-up, more comfortable "feel" (particularly in cold weather), plus a 20 per cent reduction in weight.

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For easy, quick brightwork touch-up, Du Pont's durable "Dulux" Ultra V spar varnish is now available in a pushbutton aerosol container. This marine clear varnish is two to three times more durable than the best grades of conventional varnishes. Long-term exposure tests and hundreds of in-use evaluations by boat owners around the country have demonstrated lower maintenance costs, even though the new material is relatively expensive. Its performance is due to an invisible substance incorporated in the clear varnish that absorbs the destructive ultraviolet rays in sunlight. The tough finish itself protects against the effects of wind and salt spray.

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The first general purpose gear pump in a thermoplastic material has been designed "from scratch." Tests by an independent laboratory indicate the plastic reduces horsepower requirements as much as 50 per cent below comparable metal models. Service life is more than doubled, maintenance is virtually eliminated, and the pump may be mass-produced economically. Long life allows a minimum spare part inventory. Du Pont's "Delrin" acetal resin is used for all major parts. Its solvent resistance and very low moisture absorption indicate the pumps may be used for lubrication, cooling, spraying, and general purpose handling of farm chemicals.

PLASTIC FILM FOR FENCE BUNK SILO

A fence bunk silo is an efficient and economical way to store corn silage. A horizontal silo (34 x 120 feet) was built at ground level and filled with 496.7 tons of corn. The sides were lined with sisalkraft paper and the top covered with 8 mil polyethylene plastic. At the same harvest, 86.6 tons of silage were stored in the conventional cement stave silo. High quality silage from both silos was fed with little waste. Upright temporary or tower silos require more capital for construction and additional power, labor, and elevating equipment to put the corn in and take it out. When the plastic cover of a fence bunk silo is pulled down securely between the wire and the plastic along the sides to seal out the air, drainage from the top runs outside through the wire mesh, not into the silo, as with walls of planking or concrete. — AGRICULTURAL EXPERIMENT STATION, UTAH STATE UNIVERSITY.

BLOOD KETONES AFFECTED BY EXTREME TEMPERATURES

The fact that ketones in the blood of dairy cows increase during extremely cold or hot weather may explain why ketosis is more prevalent in some years than in others. Studies indicate that extremes in temperature may be more important than other environmental factors — including diet — in the amount of ketones formed. When temperature dropped as low as 3° F., blood ketones were four to six times greater than the normal .002 to .006 per cent. At 100° F. in the summer, ketones were about double normal. Two to three days pass before a change in temperature causes a change in the ketone bodies in the blood. The reason for these changes is not known. —USDA.

FERTILIZER REQUIREMENTS OF BURNET

Burnet *(Sanguisorba minor)* is a perennial. Its tops provide forage for animals and its seeds are eaten by many birds, including quail. Burnet is one of the plants grown on the light outer coastal plain soils of New Jersey, with general fertilization practices. The effects of these practices has recently been assessed. As expected, seed yields were markedly influenced by fertilizer, but their influences on nitrogen and crude protein contents of the seed were not as great. For maximum seed production on the Lakewood soil, at least 600 pounds of 5-10-10 fertilizer are required. Fertilizer should be broadcast as a top-dressing in early spring. For high quality forage, an extra 50 pounds of N per acre should be applied after seed formation. — AGRICULTURAL EXPERIMENT STATION, RUTGERS UNIVERSITY.

DU PONT RESEARCH FINDS "ON-OFF" MAGNETIC COMPOUND

Du Pont scientists engaged in fundamental research on magnetism have discovered a metallic compound with unique on-and-off magnetic characteristics. The brittle, gray manganese compound is unique, because it will become magnetic as the temperature rises above a point predetermined by its chemical composition. Below that point it is non-magnetic. That point can be varied over a range of several hundred degrees by slight changes in composition.

Magnetism is a major force in nature and in science. What this new knowledge will lead to is not known at this time. The compound is leading to a better basic understanding of magnetism and may, in time, lead to the development of some new practical devices because it has magnetic properties never known before.

The compound's abrupt magnetic change occurs because the distance between its atoms determines how the inner magnetic forces are lined up. When the distance is less than a specific length, the forces are aligned in a non-magnetic pattern; when it is longer, they swing into a magnetic pattern. The compound contracts and expands as other substances do and its range of contraction includes the dimension at which the magnetic forces shift.

Fundamental Research

Du Pont has been doing fundamental research on magnetism and magnetic substances for several years. As a chemicals producer, the Company is interested not only because magnetic materials have major practical uses, but also because magnetic properties can furnish answers to many questions about matter. Since atomic structure controls magnetic properties, thorough understanding of magnetism can yield precise information about particles the most powerful microscope can never see.

Laboratory investigation of the new compound's behavior is shedding light on previously unknown aspects of magnetism and will extend knowledge beyond its old bounds. Discovery of the new material resulted from work with manganese compounds, chosen for study because of their interesting magnetic properties. It made its first appearance as a slight hump on one of several hundred magnetic strength curves. Three months of further study led to eventual development of the new "on-and-off" magnetic compound, chromium manganese antimonide.

PRESSURE TESTER FOR APPLES IN STORAGE

A storage index, to help growers determine how long apples will keep in storage, has been worked out for use with a pressure tester which measures firmness of the flesh. From 10 to 20 apples in each lot to be stored are tested and storage life is figured from the softest apples in the lot. Generally, apples lose firmness at the rate of from one-half pound to one pound of pressure per month in storage. If the softest apples in a lot show a firmness of 16 pounds, they would, therefore, have a storage life of four months before reaching the minimum firmness desired before sale — which is 12 pounds. — AGRICULTURAL EXTENSION SERVICE, VIRGINIA POLYTECHNIC INSTITUTE.

WEED CONTROL IN FOREST ROADS AND FIRELANES

Weed growth in forest firelanes and access roads is a serious fire hazard and greatly reduces their effectiveness as firebreaks. Control annually by mechanical means has critical limitations and may even aggravate the problem. Since 1948, many different herbicides, alone and in combinations, have been tested to find a treatment which, as a single application, would eliminate all or nearly all weeds and grass for several seasons.

Many chemicals failed to control weeds satisfactorily through one season. Several gave satisfactory control for one season, but permitted variable recovery and regrowth next season. Others limited growth for two or even three seasons. A few controlled all or nearly all weeds for several years.

Monuron at 20 pounds per acre gave satisfactory weed control for five years, and at 40 pounds per acre for at least eight years. Diuron was generally more effective and uniform than monuron. Commercial applications of diuron at 20 pounds per acre since 1956 have given excellent (generally bare) and continuing weed control with no re-treatment. Little if any injury occurred on bordering pines and oaks. — UNIVERSITY OF WISCONSIN and NEKOOSA-EDWARDS PAPER COMPANY.

"MINOR ELEMENTS" IN HAY

Early-cut hay contains more nutritionally important "minor elements" than late-cut hay. These elements are generally most plentiful in alfalfa, red clover, ladino clover, and bromegrass in the early stages of growth. As the plants became more mature they contained smaller percentages of iron, copper, and cobalt. The best way to compromise between total yield and minor element content of forages would be to cut hay when alfalfa is in about the one-tenth bloom stage.— COLLEGE OF AGRICULTURE, UNIVERSITY OF WISCONSIN.

CAUSE AND PREVENTION OF "DRY ROT"

There is no "dry rot," since decay is caused by a fungus which cannot operate in dry wood. The spores are present everywhere — in the air, in room corners, even in the coffee pot — and fungi appear wherever there is a vestige of moisture. In drier areas, decay is a minor problem. Modern ranch or split level houses must be constructed with care to avoid decay in woodwork close to the ground. The older house, usually built well above ground, is comparatively safe. Other sources of decay are roof leaks, inadequate overhang and guttering, inadequate paint maintenance, and unventilated attics. For treatment, cut off the connection — brace, frame, wooden concrete form — which serves as bridge to let the fungus grow from moist soil to joist or sill. Remove affected wood and replace with sound dry wood. Brush all adjacent surfaces with a preservative, such as five per cent pentachlorophenol or copper napthenate containing two per cent copper. — USDA.

PROTEIN REQUIREMENTS OF LAYING HENS

One of the problems in feeding high energy laying rations is to get the hen to consume enough protein for maximum egg production. Dr. M. L. Scott of Cornell University has reported that for egg production rates in the range of 75 to 80 per cent, with usual corn-soybean feeding practices, a layer must take in approximately 18 grams of feed protein per day. Since only about 10 grams of protein are used daily for egg production and body tissue maintenance, a considerable amount of protein is wasted in concentrating essential amino acids for egg development.

Dr. Scott concludes that dietary protein requirement of laying hens could probably be reduced substantially by balancing dietary amino acid levels for more efficient conversion of feed protein into egg protein.

The deficiencies of feed proteins (corn soy) are shown in the following comparison of amino acid composition (for example, methionine is over four per cent of egg protein, while it is only 1.7 per cent of the protein in a typical 16 per cent corn-soybean feed):

Amino Acid	Amino Acid Composition		Protein Ratio Egg/Feed
	Feed Protein (% Protein)	Egg Protein (% Protein)	
Arginine	6.7	6.4	0.96
Lysine	4.9	7.2	1.47
Methionine	1.7	4.1	2.41
Cystine	1.8	2.4	1.33
Tryptophan	1.2	1.5	1.25
Histidine	2.4	2.1	0.88
Leucine	9.6	9.2	0.96
Isoleucine	5.1	8.0	1.57
Phenylalanine	5.2	6.3	1.21
Threonine	4.1	4.9	1.19
Valine	5.1	7.3	1.43

fertilizing corn to meet the cost-price squeeze

As farmers raise their sights on corn yields to meet the cost-price squeeze, it is evident that fertilizer application is not the limiting factor in high return corn production. This was proven on a practical basis in five-acre fields on nine Indiana farms during 1959 and 1960. Although there is no short cut to maximum corn yields, these trials demonstrated that corn can "take" all the fertilizer needed to provide the nitrogen, phosphorus, and potash for 300 bushels or more to the acre. This permits combining hybrid qualities and methods of culture with economically sound fertilization levels for the most efficient production of corn at the lowest unit cost.

By scaling fertilizer application to levels appropriate for today's hybrids and methods of corn culture, recommendations for desired yield levels can be simply calculated and easily applied. Such calculated recommendations for 150 bushels per acre were tried by two southern Indiana farmers during 1960. Fertilization rates and plant population were specified. Otherwise the farmers followed their normal practices — and both achieved their goal.

These two trial prescriptions were the outcome of a program, now going into its third year, in which the nine Indiana farmers have maintained five-acre test fields in cooperation with the Du Pont Company and the Indiana Farm Bureau Co-operative Association. Fields were heavily fertilized in 1959 and in 1960, receiving a total of 3,300 pounds of fertilizer per acre in 1960, including 600 pounds of nitrogen from 1,330 pounds of "Nu-Green" fertilizer compound. Rows ranged from 19 to 32 inches apart, compared with the usual 40 inches, and stands ranged from 25,000 to 38,000 plants per acre.

The leach-resistant qualities of "Nu-Green" make possible use of this amount of nitrogen as a single spring plow-down application. There were no toxic effects in any of the fields from the very high rate of fertilization. Tissue tests, as well as frequent field observations, indicated no symptoms of nutritional disturbance at any time during the season.

INDIANA CORN FIELD used in corn fertilization experiment with Du Pont "Nu-Green" compound showed that fertilizer application is not the only limiting factor in high return.

Fertilizer and population levels were calculated on a potential of 300 bushels to the acre. Major limiting factors on yields appeared to be light conditions and micro-atmosphere. Soil condition was generally improved at the start of the second year, as evidenced by thorough breakdown of organic matter, good moisture relationships, and vigorous root growth. The atmospheric and light problems might be overcome by hybrid selection and methods of culture.

High yields as such are not a practical goal for most farmers. The important objective is to achieve maximum yields at lowest unit cost. The foregoing evidence indicates that such a goal can be pre-determined and a prescription written for reaching it.

CORN STALKS dwarf Du Pont representatives checking results of trials using heavy fertilization with "Nu Green" fertilizer compound in Indiana during 1959 and 1960.

COMPATIBILITY OF HERBICIDE SPRAY COMBINATIONS

By Lyall F. Taylor, Ph.D.
Industrial & Biochemicals Department
E. I. du Pont de Nemours & Co. (Inc.)

The large number of specialty weed killers now available makes it frequently desirable to combine two or more materials for efficiency and economy of application. For example, the substituted urea herbicides, which are wettable powders, and have a long residual life in the soil, are often combined with other herbicides which provide more immediate contact-type herbicidal action.

From the standpoint of chemical compatibility in the spray tank, there has been little or no difficulty in combining substituted urea materials with other commonly used weed killers. For example, "Karmex" diuron weed killer and "Telvar" monuron weed killer each have been used successfully with "Ammate" weed and brush killer, with TCA, borates, chlorates, dalapon, 2,4-D, amitrol, and weed oils.

Flocculation Problems

Under certain circumstances, the use of these wettable powder materials in mixtures will result in a flocculation problem. This is much more likely to happen when mixing the wettable powders with chlorates, borates, "Ammate", and arsenical materials, which are used in relatively high concentrations than with dalapon, amitrol, or 2,4-D. Flocculation may also occur with very acidic water, or very salty water, such as ocean water. The best remedy for a flocculation problem is good agitation in the tank which is needed anyway when applying these wettable powders.

Protective colloidal agents can be used to prevent flocculation and improve dispersion. These include methyl cellulose, polyvinyl alcohol, gum arabic, glue, soluble caseinates, and milk solids. Another material, goulac, is effective if used at a level of five to 15 per cent of the substituted urea herbicide by weight.

Mixing Problems

Mixing problems may also develop when "Karmex" or "Telvar" is used in an oil-water mixture, although they can be suspended directly in diesel oil or herbicidal oil. Generally, the problem in oil-water mixtures is due to poor emulsifying. The only remedy is a better emulsifying agent, as increased agitation may only make it worse.

If it becomes necessary or desirable to use oil-water mixtures despite poor compatibility, the colloidal materials can be used to improve the mixture. The colloidal agent should be mixed with the weed killer in water before adding the emulsifiable oil. Where 2,4-D is the second material in the mixture, use of the water-soluble amine formulations will avoid the mixing problems which may develop with the oil-based ester formulations.

Test of Procedure

When preparing oil and water mixtures, it is best to make a small test of proposed mixing procedures in quantities of one pint to one gallon, and follow the procedure that works best. The wettable powder and oil should never be added to water at the same time. It is generally best to add the wettable powder to the water first, mix it into suspension, and then add the oil. With some oils it is, however, better to emulsify the oil in the water first, and then add the wettable powder to the mixture.

If any mixtures are to be used on cropland or pasture, precautions regarding cropping and grazing should be carefully followed to avoid residues in food products.

DU PONT AWARDS $1.4 MILLION IN EDUCATIONAL GRANTS

Grants over $1.4 million for the 1961-62 academic year are being awarded to 159 universities and colleges in Du Pont's annual program of aid to education for fundamental research, for strengthening the teaching of science and related subjects, and for science and engineering facilities. Over $654,000 goes to some 100 institutions to support teaching of science and mathematics, as well as other liberal arts subjects, for education and research in biochemistry in medical schools, and for postgraduate teaching assistant awards and scholarships for prospective high school teachers of science and mathematics.

Grants total $475,000 to 37 universities for unrestricted fundamental research in the physical sciences, including chemistry, chemical engineering, physics, mechanical engineering, and metallurgy. The universities determine the research to be undertaken and are free to publish the results. An additional $50,400 is for 28 summer research grants to enable individual staff members of 24 universities to undertake research of their own choosing during the summer.

A $250,000 fund is for capital grants for science and engineering facilities at 11 independently controlled institutions, and will help with the cost of new buildings, equipment, or renovation of existing facilities.

EIGHT PRODUCTS ADDED TO DU PONT *garden chemicals*

Eight new products have been added to the Du Pont garden chemicals line for 1961, bringing the total to 41. The eight include two special formulation plant foods, a handy insect-barrier chemical, a special rose-cane sealer, a newly developed special oil, and two familiar garden items, sulfur and rotenone, plus a sprayer of "professional gardener" caliber.

The plant foods are for roses, azaleas, and evergreens. The Rose Food (8-8-8) is a special blend of organic and inorganic material formulated to supply all of the necessary plant food nutrients for the optimum growth of roses. The Azalea and Evergreen Food (10-5-5) is a complete plant food especially prepared for plants which require acid soil conditions. Both contain "Uramite" fertilizer compound. One application yearly supplies balanced plant feeding for a full growing season.

The specialty products include aerosol-packaged Tree Bander Insect Barrier. The easy-to-apply chemical is designed to form a sticky barrier which protects trees and vines against crawling insects for long periods. Rose Cane Sealer protects pruning cuts of roses and other small wounds of trees and shrubs. A handy dauber applicator similar to those used in liquid shoe polishes is attached to the cap.

A newly developed oil that can be used as a dormant oil spray, and during the growing season as well, will be introduced later this year. It contains malathion insecticide to increase its effectiveness against insects.

The versatile insecticide, one per cent rotenone, as spray and dust has been added to the line. "Sulforon" X wettable sulfur, a microfine sulfur, for use in sprayers for control of powdery mildew of roses and other ornamentals, is another garden product which will be available.

The Du Pont Company has introduced a simple system of accurately measuring garden chemicals, using a special hose sprayer. Researchers found that garden chemicals fell into three spray rates. Three snap-in nozzles were developed to calibrate and automatically deliver the appropriate amount of the chemical and the specified rate of spray.

The Company is adding a professional-type sprayer to its line. It has a nozzle designed to direct spray upwards for covering the underside of plant foliage. It converts to a mist-type sprayer by a simple nozzle attachment. The gun handle design and the extended nozzle assure ease of handling. Parts are molded of Du Pont "Delrin" acetal resin and the jar of unbreakable polyethylene. Non-corrosive, "Delrin" is a light and durable plastic, and assures easy spraying under difficult conditions.

Decomposition of Chemicals in Soil

More and more man-made organic compounds are being used for soil treatment in agriculture. This trend frequently raises at least two questions: "Do these chemicals build up in the soil?" and "What is their effect on soil micro-organisms?"

In studies of hundreds of organic agricultural chemicals over a decade or more, Dr. J. J. Reid, Pennsylvania State University bacteriologist, has found no organic chemical that cannot be decomposed by soil bacteria. None of the chemicals he tested had any lasting harmful effect on the bacterial population of the soil.

One of Dr. Reid's recent studies included representatives of the most important herbicidal chemical families — aryloxy, dinitro, substituted urea, chlorinated acid, triazine, and triazole — as well as many related compounds.

These were tested at much higher levels than would be used in the field. The high rates were needed for two reasons. First, a significant amount of the compound was necessary for analytical procedures to determine decomposition rates and ultimate residues. Second, one method of determining the effect of each compound on bacterial life was to culture typical species with only the test compound as a source of energy. This technique required a much higher concentration than would ordinarily occur in agricultural practice.

The incubation period required for various rates of decomposition was found to be an important measure of the soil life of a compound. For example, a rather difficult compound was incubated for a period of 35 days. After the first 20 days of incubation, about 12 per cent of the compound in the original test solution had been destroyed. At 35 days, about 20 per cent of the compound had been destroyed.

All the herbicidal compounds tested proved useful to some soil bacteria as energy sources. Some are decomposed more rapidly than others, but in most cases, he found that soil bacterial population adapts itself progressively to the compound. With proper temperature, moisture, and aeration, none of the compounds persisted over long periods of time, and there was no extended interference with typical biological processes in the soil such as nitrifying action.

Farmers Ask About . . . .

Q: How serious can weed loss be in soybeans?
A: **An Arkansas study showed yield of 32.4 bushels per acre for beans completely free of Johnson grass and only 12.3 bushels in infested areas.**

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Q: How many chemicals does industry produce for farm use?
A: **The 50 million tons of farm chemicals produced annually include more than 200 basic products, compared with 50 only 20 years ago. USDA says 90 per cent of this volume is of chemicals unavailable at the beginning of World War II.**

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Q: Is industry affected by the "profit squeeze"?
A: **Very much so. Although sales were higher than in 1959, profits for 1960 declined in most industries.**

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Q: How long can weed seeds survive?
A: **The USDA reports that seeds of a number of weed species buried in the late 1800's were able to germinate last year.**

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Q: Can too much light be injurious to poultry?
A: **Yes. USDA tests show birds getting too much light too young produce later and are inferior in body and feather development.**

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Q: What month is best for soybean planting in Arkansas?
A: **A four-year study shows May to be the best month for planting.**

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Q: What part of the American labor force is in jobs connected with agriculture?
A: **Close to 25 per cent, including processing and industrial production which reaches farmers.**

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Q: Does Du Pont have as many stockholders as it has employees?
A: **Many more; nearly 230,000 stockholders and 86,000 employees.**

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Q: Does atmospheric ozone damage plants?
A: **A recent report from New Jersey refers to ozone as "our most important single phytotoxic (plant-poisoning) air pollutant, affecting many plant species."**

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Q: How extensive is pre-packaging of vegetables?
A: **About 90 per cent of carrots, 60 of tomatoes, 55 of potatoes, 35 of dry onions, 20 of celery, and 10 per cent of corn are packaged in consumer units.**

Q: How is the wheat streak mosaic virus transmitted?
A: **The virus is transmitted by the mite vector Aceria tulipae (Keifer). The disease was first identified in 1932.**

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Q: What is the cost of so-called "fringe" benefits in industry?
A: **The average cost to U.S. business and industry is $1,100 per employee, or $30 billion annually. Du Pont's cost is about $150 million a year.**

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Q: How should grape diseases be controlled?
A: **The Georgia Experiment Station reports "Fermate" ferbam fungicide "gave excellent control of black rot for increased yields."**

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Q: Does time of harvesting offset loss in soybeans?
A: **Yes. An Ohio study shows shattering loss to be twice as great at noon as at nine in the morning.**

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Q: Do diseases of wild animals threaten domestic livestock?
A: **The World Food and Agricultural Organization lists over 100 diseases transmissible to livestock. Some of these diseases may also be transmitted to humans.**

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Q: What changes have occurred in Du Pont's ratio of scientific and technical personnel?
A: **One out of seven employees is technically trained (1 in 40 being a Ph.D.). The ratio was 1 to 80 in 1940.**

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Q: Will fungicides used in the field control diseases of greenhouse tomatoes?
A: **Maneb, widely used for the control of major fungus diseases, is specifically listed for greenhouse tomatoes.**

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Q: Are hornflies becoming resistant to methoxychlor?
A: **No. Methoxychlor remains the best and longest lasting insecticide for both beef and dairy cattle.**

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Q: Are there new developments in control of gladiolus diseases?
A: **Recent work in several areas indicates dipping bulbs in the "Ceresan" liquid seed disinfectant formulations may be superior to standard dry treatments. For the home grower, treatment with "Delsan" A-D seed protectant shows promise.**

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